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Low nitrous oxide production in intermittent-feed high performance nitritating reactors

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Nitrous oxide, nitritation, ammonia-oxidizing bacteria, nitrous oxide production pathways, intermittent feeding, pH

Summary

Nitrous oxide (N_2O) production from autotrophic nitrogen removal processes, especially nitritating systems, is of growing concern. N_2O dynamics were characterized and N_2O production factors were quantified in two lab-scale intermittent-feed nitritating SBRs. 93 ± 14% of the oxidized ammonium was converted to nitrite, with the average total net N_2O production of 2.1 ± 0.7% of the ammonium oxidized. Operation with intermittent feeding appears an effective optimization approach to mitigate N_2O emissions from nitritating systems. Net N_2O production rates transiently increased with a rise in pH after each feeding, indicating a potential role of pH in N_2O production.